IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:
Ikeda
Serial Number: 09/870,771 Group Art Unit: 1745
Filed: June 1, 2001 Examiner: Gregg Cantelmo
Title: ELECTRODE STRUCTURE, BATTERY AND ELECTRICAL DOUBLE-LAYER CAPACITOR AND METHOD OF MANUFACTURING SAME

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DECLARATION BY APPLICANT REGARDING
OVERLY BROAD RANGE AND UNEXPECTED RESULTS

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1453

August 3, 2004

Commissioner:

I, Takaya Sato, being first duly sworn, on oath makes the following statement and declaration of facts:

1. I am a joint inventor of the above-identified patent application (the "subject application").
2. I am employed as chief scientist at Nisshinbo Industries Inc. of Tokyo, Japan ("Nisshinbo"). I attended Shinshuu University, where I obtained a Masters degree in Chemistry, and then I obtained my PhD from Kyoto University in 1992. I have been employed with Nisshinbo for the past nineteen years and during my time there I have been involved in significant research, development and testing in the electrochemistry and polymer fields. I have also been involved in the creation and invention of several kinds of products in the polymer and electromechanical device fields, thereby utilizing my technical experience and background. Through my experience I have become well aware of the standards and terminology

used in the battery and capacitor industry and have filed patent applications in the polymer science field. In the same field of art I have filed numerous domestic, Japanese patent applications throughout my nineteen years with Nisshinbo and have had about thirty patents issued in Japan in the same field of art. I have also filed ten United States patent applications in the same field of art since the year 1985 and have had ten patents issued in the United States.

3. I have read and understand the subject application and the comments of the Examiner contained in the Office Action mailed 06/09/2004. The Examiner stated that there is still no clear evidence supporting Applicant's arguments which shows that the claimed range achieves unexpected results relative to the prior art range and that previous statements were not in the form of a declaration and were therefore void of support for such arguments. Therefore, Applicant hereunder provides supporting evidence in declaratory form in conformance with Examiner's recommendation.

4. OVERLY BROAD RANGE OF THE PRIOR ART; AIR SPEED. Tanaka teaches air ranges from 0.1 to 100 m/sec and preferably 1 to 30 m/sec. The present invention, however, teaches using an air speed of 0.1 to 3.0 m/sec. This air speed is significantly narrower than that of Tanaka and because of the extremely narrow, limited range the present invention achieves unexpected results.

5. The Examiner states that a prima facie rejection is properly established when the difference in the range or value is minor. Titanium Metals Corp. of Am. V. Banner, 778 F.2d 775, 783 and 227. Applicant respectfully disagrees with the Examiner in that the difference in the range or value is not minor. Applicant contends that Tanaka's range of 0.1 to 100 m/sec is overly broad and that it would not be obvious to someone in the art to utilize the air speed taught in the present invention.

6. Tanaka teaches a preferred range of 1 to 30 m/sec. This is still an overly broad range when compared to the extremely narrow range taught by the current invention, i.e., 0.1 to 1 m/sec. and Applicant contends that it would not and was not obvious to one in the art to use such a slow air speed as it was never done in the past and problems still persisted in the past which

the present invention has addressed and solved due to the creative use of an extremely narrow and slow air speed.

7. Claimed range achieves unexpected results relative to the prior art range; Air Speed. Applicant further argues that, even though the claimed ranges "overlap or lie inside ranges disclosed by Tanaka," there is sufficient evidence indicating that the claimed ranges are critical. MPEP 2144-134, III Rebuttal of Prima Facie Case of Obviousness, *Woodruff* states that the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range.

8. The conventional method of FIG. 4 (A) shows the use of fast moving air (15 to 25 m/sec.). Tanaka teaches the preferred range of 1 to 30 m/sec. and therefore FIG. 4(A), the convention method, is within Tanaka.

9. In Tanaka or FIG. 4(A), because fast moving air is used the compound mixture surface is **quickly** warmed and the solvent around the surface is also **quickly** vaporized. As a result of the fast moving air speed several problems occur. First, the solvent at the internal portion of the compound mixture and the solvent near the current collector 13 migrate quickly to the vicinity of the surface area in order to try to compensate for the solvent that has vaporized from the surface area. Simultaneously the binder and the powdered conductive material contained in the solvent **quickly** migrate to the vicinity of the surface area. As a result, the density/ concentration of the binder and the powdered conductive material at the current collector side is lower. The result of these two actions is a fragile electrode layer that is easily broken or peeled. Also, the resultant resistivity in the vicinity of the current collector 13 becomes high and the overall resistance of the electrode layer increases.

10. In the present invention, the claimed range displays several unexpected results and superiority of properties shared with Tanaka's range. First, the resultant electrode layer of the present invention adheres better to the current collector and is more durable than Tanaka. Also, the resistivity in the vicinity of the current collector 13 is lower and the overall resistance of the electrode layer is decreased. These are both clearly shown in Table 1

of the Specification of the subject application. These unexpected superior results are achieved because the warm breeze 51 **gradually** warms the compound mixture 31 in its entirety and **gradually** vaporizes the solvent from the surface of the compound mixture 31. The current method prevents the quick migration of the compound mixture, binder and the powdered conductive material 14 and therefore the density/concentration remains uniform overall.

11. The resultant properties differ to such an extent that the differences are really unexpected. MPEP 716.02 Allegations of Unexpected Results, *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Even though the current invention has properties that are shared with the prior art the current method shows evidence of unobvious or unexpected advantageous properties, specifically, the present invention is much stronger and more durable than Tanaka and the admitted prior art and has higher resistivity than that of the prior art. MPEP 716.02(a).

12. Overly Broad Claims, Temperature. The Examiner states that Tanaka teaches a temperature range from 20° to 350° C and preferably 40° to 200° C. As argued above the Applicant contends that Tanaka's ranges are **overly broad** and that the difference in the range or value is **not** minor. Tanaka's range of 20° to 350° C is overly broad and that it would not be obvious to someone in the art to utilize the narrow air temperature range taught in the present invention. Tanaka teaches a preferred range of 40° to 200° C. This is still an overly broad range when compared to the extremely narrow range taught by the current invention, a warm breeze 51 of the present invention is preferably in the range of 60 to 150°C, and Applicant contends that it would not be obvious to one in the art to use such a narrow temperature range.

13. Claimed range achieves unexpected results relative to the prior art range, temperature. Even though the claimed ranges "overlap or lie inside ranges disclosed by the prior art," there is sufficient evidence indicating that the claimed ranges are critical. *Woodruff* states that the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range.

14. As argued above, the temperature range of the present invention is much more narrow than that taught in the prior art. The admitted prior art (APA) uses hot air at 80 to 200 centigrade. Tanaka uses 20 to 350, preferably 40 to 200. On the other hand, the present invention blows a warm breeze between 60 to 150℃ onto the coated compound mixture to gradually vaporize the solvent. The present invention results, clearly shown in the specification, provide sufficient justification to overcome this rejection. That is, the resultant electrode of the present invention is much stronger and has lower resistivity than that of existing art. As argued above, the resultant properties differ to such an extent that the differences are really unexpected. *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Even though the current invention has properties that are shared with the prior art the current method shows evidence of unobvious or unexpected advantageous properties, specifically, the present invention is much stronger and more durable and the current invention has higher resistivity. MPEP 716.02(a).

15. Because of the above described unexpected results and advantages of the current invention and because of the detailed explanation of these results and how they were achieved, as set forth in the specification, any rejections regarding the claims of the subject application are improper. Therefore, Applicant respectfully submits that claims 1, 3, 4, 9, 10 and 11 are now in condition for allowance and notice to that effect is requested.

16. I hereby declare that all statements made herein are of my own knowledge are true and that all statements made on information and belief are believed to be true and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Takaya Sato — Takaya Sato

August 3, 2004 — Date

Tokyo — Place